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The spade. Two kinds of spades are used. These are called "Siem" (this is more of a scoop) and "Tiok-Kout-Dine" or, literally, Pick for breaking ground. The first is formed by a narrow iron blade which is slightly concave lengthwise and is provided with a socket into which a handle is fastened. The second is made of wood, and the blade and handle are in one piece. The lower part is fixed into an iron frame which also binds both sides [379] [Illustration] [380] [Blank page] [381] for about two-thirds of their height. The spade is used to make holes and to turn over the soil.

The machete. The machete [coupe-coupe] or felling sword which is used for heavy work is called "Pha." It is composed of a solid, broad and rather short iron blade with a thick back which is fitted into a wooden hilt with an iron ferrule.

Another kind of knife, called "Mit-Tok" or "Mit-Noi," has a blade which is narrower but longer than the above. This tool is used for fine work, such as cutting and splitting bamboo, rattan, etc.

The ax (Khouane-Hone, Khouane-Mou, or Khouane-Bong, "hatchet"). The ax is formed of a narrow, two-edged and rather short blade. A hardwood shank .6 to .7 meter long is fitted into the head. This shank itself is held by wedges, a third of the way along its length and slightly above the blade, in a mortise which crosses the end of a handle .6 to .7 meter long. The ax is used to cut trees, to hew posts and planks, etc.

It is at the very least odd to note that, except the blade which is a modern innovation, this ax is similar in every respect to the kind used during the age of polished stone.

The other tools used are: the hammer or "Khone-Lek," the saw or "Lueui," the file or "Lek-Sambai," the wood chisel or "Siou," the awl or "Lek-Si," the pincers or "Kab-Lek," the anvil or "Thang-Ti-Lek," and finally the bellows or "Soub."

CROPS TO BE ENCOURAGED

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Most of the crops which are now grown in Laos can be improved and developed, and this must be done if we are either to increase exports of farming products or to provide more well-being for the inhabitants.

In a general way, the administration can perform a useful task by increasing the number of experimental farms, by distributing [382]

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selected seed to the natives, and by giving them advice and, if necessary, orders.

The reader will doubtless be struck by the fact that we shall often reiterate, in speaking of the crops which should be encouraged or introduced, that the administration's role should be to make trials of such and such a plant. This is nevertheless the case. It must not be imagined that individual initiative will suffice, for the comparatively large capital investment which any agricultural enterprise requires will not be made until after any given crop has proved to be successful. It is therefore incumbent on the administration to make these first trials. Was it not the Government which set up the first plantations of tea in Assam, of cinchona in Java, and of tobacco and coffee in Sumatra? The colonists did not come until later, when the period of groping and failure was over, and they were then able to act with assurance almost everywhere.

Rice. The cultivation of glutinous rice should most particularly be developed in southern Laos, with a view towards the manufacture of alcohol.

We have seen above how small a proportion of the cultivable land has heretofore been utilized. Much land suitable for making ricefields has not yet been cleared. In spite of the remunerative price offered them for the produce of the soil, and in spite of the encouragement which they have received from all quarters, the natives do not yet understand all the advantages which they would gain from developing their crops. It is nevertheless easy to see that since our arrival in Laos the inhabitants have realized that the regime of terror and exactions has disappeared and that an era of prosperity and justice is opening up before them, and they are increasingly devoting themselves to the work of the fields. Ricefields have appreciably increased in extent, either because new land has been cleared or because abandoned fields have been brought back under cultivation.

Glutinous rice is assured of a certain and profitable sale on the markets of Cambodia and Cochinchina (1). It may be anticipated

(1) At the present time, with the existing means of transport, exporting rice from Bassac to Pnom-Penh yields an average net profit of 13 francs per ton.

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that if rice production were to increase and continue to progress, distilleries and starch factories might be established in Laos [383] to utilize the high proportion of starch which rice contains.

The cultivation of maize should also be encouraged with a view to the same end.

Tobacco. It is to be desired that the manufacturers who deal in tobaccos should become aware of the very real qualities of those of Vien-Tiane and Nong-Khay. Persons or corporations who prospected this region would immediately find, in the cultivation of tobacco and its direct marketing, resources which would greatly reduce the cost of their explorations.

There is also room for one or several Europeans who would engage in tobacco farming on a share-cropping basis, allowing natives to cultivate it in the beginning and prepare it in their own way, until it has been made into plugs. Then later on they might experiment with seed from Havana and the Philippines, and attempt industrial fermentation. Without making any advance judgment as to the eventual results of these improvements, it may yet be said that this crop would yield rewarding profits, since prices in the region of production vary between 50 and 100 francs per hundred kilograms, whereas they are as high as 125 to 187 francs in Bangkok.

Whatever the case may be, the cultivation of tobacco may be extended, since there is no shortage of suitable land. It is also capable of improvement, for production would certainly double if the natives used fertilizers less parsimoniously.

Cotton. We have noted that the existing species are all of the short staple variety and all have a low yield. Plantings of a long staple variety have been made in the experimental garden of Luang-Prabang, and have given satisfactory results. The Superior Commandant of Upper Laos reported the experiment as follows:

"Trials were made with seed from the botanical garden of Hanoi.

"The minimum height of the plants was one meter and a few, those from Virginia, reached heights as great as 2.5 meters.

"The bolls were as large as chicken eggs, whereas those of the native cotton plants [384] were at best as large as pigeon eggs, and their average number was 400 per plant.

"As regards the quality of the textile material, it is unquestionably superior to that of all the cotton heretofore harvested in the country.

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"These results are extremely encouraging for the future, and there is every reason to believe that if undertaken on a large scale and in accordance with the most improved methods, the cultivation of cotton could within a short time become an important source of revenue" (1).

(1) Bulletin économique de l'Indo-Chine, 1899.

This report is correct, and yet one should not think that if the natives are left to their own devices they will take any care to secure cotton seed of an improved variety or modify their farming methods.

The administration must step in and furnish this new seed to the population, and force it to cultivate the seed in accordance with the better methods.

Such intervention on the part of the administration will come as no surprise to those who are acquainted with the carefree ways of natives of all races in Laos, and their scant eagerness to give up their old routines, even when they are being asked to adopt some measure of unquestioned utility. In proof of this fact we need merely cite the difficulties encountered and the unwillingness which had to be overcome when rice storehouses were set up in each village, even though these were designed to save the inhabitants from famine.

A further example may be cited in this connection, showing that in certain cases firmness is not to be eschewed. The crop of cotton is one of the chief products of Russian Turkestan but, as is the case in Laos, the cotton being grown in the country when the Russians arrived was of the short staple and low yield variety.

The administration first tried to increase production in the country by distributing seed from Georgia cotton and by giving advice on its cultivation.

All to no avail, for it came up against the routinism, the indifference and the fatalistic spirit of the population. Then it acted by order, almost manu militari, and obtained amazing results, such that a section of railroad which had been constructed as a strategic line, [385] that is to say with no hope of commercial traffic, is now employed in transporting cotton. The yield from the crop is fivefold, it would seem, and prices have doubled.

The creation of the cotton farm of Tachkent has had similar results. [Illustration here]

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Sugar cane. The production of sugar cane, which is still not very significant in Laos, deserves to be encouraged. Later on when this crop had been developed, the Laotians might be trained in the methods of the first stage of refinement. They would then be able to produce gray muscovado and sugar candy, which are easily exportable.

Southern Laos is the part of our possession which would lend itself [386] best to the extension of this crop. Although of secondary importance, it is nonetheless deserving of attention.

Benzoin trees. Increasing the number of trees which are producers of this precious resin is again a task for the administration. After a serious study of the conditions of growth of the plant in Laos, of its habitat and of the nature of the terrain best suited to it, it would be possible to set up seed gardens designed to supply young plants either to the natives or to Europeans who settled in the country and were interested in this crop. It yields a rich product, which brings a high price on the market. Benzoin is, in fact, widely used in perfumes and in the manufacture of varnishes.

Lac trees. All who are acquainted with Laos are unanimous in agreeing that increasing the production of sticklac is one of the main factors in increasing the country's wealth. What, indeed, could be more simple, thanks to the easy and rapid multiplication of the "Kok-Toua-He," the tree which grows almost without care and lends itself so well to the establishment of colonies of coccus lacca, the producers of a superior quality of gum lac?

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Cardamom. It would seem that experiments with growing true cardamom, as it is grown in Cambodia in the province of Pursat, might be attempted in Laos. The natives would have everything to gain from giving up the cultivation of wild cardamom for that of true cardamom, since the latter brings from five to ten times more than the former on the market of Pnom-Penh.

Until such time as this precious seed is introduced into Laos, it will be well to extend and encourage the cultivation of the present variety of cardamom. All those who have engaged in the production and commerce of this seed (1)--the mountainfolk who grow it, the

(1) It is much sought-after by the Chinese, who use it as a condiment as well as in pharmaceutical preparations.

249 263 438 Chinese and Laotian middlemen and even the few European merchants--have found that it brings in rewarding profits. Indeed, by exporting this product the latter are assured of an almost certain gain of 20 to 30 percent.

248 439 [387] Ramie. There is also much to be gained from increasing the production of ramie or Chinese nettle. It is assured of an outlet in Cambodia, where it sells for as much as 80 francs per hundred kilograms.

219 185 Cinnamon. The extension of the plantations and gardens of cinnamon trees already in existence in the province of Vien-Tiane deserves serious encouragement. The bark of these trees is a valuable product which is much sought-after in China and in Europe.

276 656 Opium poppies. The Government of Indo-China, which is both the preparer and seller of chandoo or opium for smoking, is the party which would gain most from obtaining the raw drug on French territory. It is, indeed, still dependent on British India for this product, and can acquire it only on extremely disadvantageous terms.

Since much time must still pass, however, before the Meos and the Yaos give up their age-old methods, it would be essential for the intensive cultivation of the opium poppy to be undertaken by Europeans on behalf of the administration. This would be possible if there were a guaranteed labor supply in the form of Chinese coolies, who would be enlisted primarily for the greater part of the work, and of native specialists who would deal only with scarification of the capsules, harvesting the opium and the first stage of its preparation.

These delicate operations are the ones which the Meos and the Yaos like best, but they dislike plowing, fertilizing, weeding and irrigation, all of which tasks are indispensable for obtaining a high yield of capsules and consequently of the raw drug. It would therefore be best to entrust this heavy work to foreign coolies, and it is probable that after a certain time they too would be capable of extracting the opium. Impelled by their example, the natives would doubtless then be seen to break with their prejudices and devote themselves also to intensive cultivation so as to reap its full benefits.

The role of the administration would then be at an end, and it would gradually diminish its intervention as free cultivation of the poppies increased.

[435 Raw opium which is produced locally or which comes from [388] neighboring countries is worth 22 francs, 50 centimes to 32 francs, 25 centimes per kilogram, depending on quality, in northern Laos.

centimes per kilogram, depending on quality, in northern Laos.

Betel nuts. It is a well-known fact that commerce in betel nuts is quite extensive in the Far East, since the number of consumers runs into several millions. It is therefore a crop to be developed and encouraged, all the more so because the climate, soil and temperature of Laos are perfectly suited to plantations of this type. 24 185 435

In Laos the harvest from about three trees sells for one tical (1 franc, 50 centimes). In Cochinchina the produce of a single tree is worth about one piaster (2 francs, 50 centimes). It is therefore evident that it would be profitable to export this nut in large quantities.

PRUNING AND GRAFTING FRUIT TREES. The natives in Laos, as a consequence of ignorance, lack of initiative, carelessness and also lack of the necessary means, do not give sufficient care to fruit trees. The result is that the latter, at least in the case of most varieties, bear only degenerate fruits. 24 185

It is to be desired that these trees should no longer be abandoned in this manner, without being pruned, trimmed or grafted. Thought might then be given not only to improving the natives' diet in the way of fruit, but perhaps also to creating new resources by preparing certain kinds of preserves, fruits with juice, compotes and jams.

Again it is the administration alone, with the means of action at its disposition and the authority in its possession, which could act in an effective manner.

The colonial and botanical gardens, etc., should be able to provide administrators with precise information on the care to be given to the various fruit trees, both in order to improve their fruit and to increase their yield.

The obvious middlemen between the administration and the population are the bonzes. The latter, if they were the possessors of industrial knowledge, would be listened to and imitated above all others when they provided an example by giving their care to the numerous varieties of fruit trees which they keep up within the enclosures of pagodas or nearby.

149: Reinach--285 G-3 (no date) 1901 AM1 Indochina
Laotians AM8

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CROPS TO BE INTRODUCED

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Here is a list of some crops which, among others, might profitably be introduced into Laos.

Manioc and sorghum. Trials successfully carried out, particularly in Muong-Son, prove that these plants can be grown there on a large scale.

Abaca. In Laos there are several varieties of musa which grow wild and whose fiber is used in the country for making various kinds of string and cord, tow for caulking pirogues, etc. These trees are the "Kok-Kouey-Kem" or seed banana, and the "Kok-Kouey-Pa" or forest banana. They are found on the lowest slopes of hills, along water-courses and in the bottoms of valleys. It would be interesting to try and identify these varieties of banana tree with the trees which produce abaca or Manila hemp, and to make comparisons between the fibers which they all produce.

In any case, seeds or plants could always be imported from Manila in order to create plantations in Laos.

Cinchona. The cinchona tree grows on land from which forestation has been newly cleared, at altitudes between 800 and 1200 meters. The soil must moreover be rich in humus. It would therefore seem that northern Laos is clearly indicated as a region for growing the cinchona (1). In the Laotian forests there is even a

(1) The Cinchona succirubra has been extremely successful in Jamaica and Java.

liana called "Khua-Khao-Ho" (2) which is used for its fever-inducing

(2) See Chapter III, p. 120.

properties. Both wood and bark are ground up, as is done with licorice root. It would be worthwhile to see whether this liana has any relation to the cinchona.

Cacao trees. This crop is among those whose introduction into Laos may be recommended. In order to develop, cacao trees need a hot and humid climate and high valleys with deep alluvia which are situated at altitudes between 100 and 200 meters. [390] Thus it might very well be that this shrub should prove successful in southern Laos.

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Coffee. The coffee bushes which have been planted in Laos by way of experiment in different regions and at different altitudes, depending on the variety (Liberian or Arabian), seem to be thriving. A few small plantations, like those on the Black River (on the frontier of the Sib-Song-Chau-Thai) and at the mission of the Bahnars, are even said to be producing a full yield already. But these results are still too sketchy for us to be able to state that the cultivation of coffee in Laos is ready to leave the period of experimentation and be undertaken on a large scale.

If it is true, as some say, that planting coffee in Annam and Tonkin has been extremely disappointing, then this does not offer encouragement for trying this crop in Laos.

Jute. The fiber of this plant is in great demand for making grain sacks and cloth wrapping material known as gunny. Although some jute is grown in Annam and Tonkin, in Indo-China we are still dependent for this product on British India, which sends us large quantities of it. The cultivation of this plant might be tried in Laos, in the higher parts of the country.

III

FOREST PRESERVATION AND CONSERVATION--REFORESTATION

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The administration of Laos has made an effort to remedy, insofar as possible, the indifference of the population as concerns conservation of forest resources. It has taken measures to facilitate the reforestation of hills and plateaus which have been cultivated as rais.

These measures were indispensable, if any attempt was to be made to prevent the hills and hillocks of Laos, as well as the mountainsides, from becoming bald and sterile over the years as has already occurred in the Sib-Song-Pahn-Na and the northern regions. The heights do not have any trees or green foliage, the rock is bare on their [391] prominences, and only in the valleys which face to the north is there any soil containing vegetable matter.

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This deforestation and denudation are due to the annual burnings which spread from one rai to another at the time when the inhabitants turn to new clearings. Out of indifference they allow the fires to consume the young vegetation which was beginning to cover the old rais and which, by holding back the soil containing vegetable matter, was attenuating the destructive effects of erosion.

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Years	Number of animals exported	Average purchase price in Laos	Sale price at outlet markets
		francs	francs
1898	103 Horses	50	112.50
1899	185 Horses	From 30 to 125	From 88.50 to 225
	14 Mares	From 30 to 75	From 40 to 95

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Finally, we recommend the introduction of donkeys into Laos, with a view toward producing mules by coupling the donkeys with Laotian mares. The mules of Yunnan, which are highly reputed, reach heights as great as 1.32 meters. Extremely sturdy, they can readily carry a net weight of ninety kilograms of merchandise, not counting the saddle and pack-saddle. It is obvious that much use might be made of these animals in Laos for all kinds of transport.

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Buffalo. Buffalo breeding is much in honor throughout all of Laos. It supplies the needs of agriculture and of food consumption, which [403] absorbs a large number of these animals, particularly young ones. Many of them, in fact, are sacrificed on the occasion of celebrations and various ceremonies, while others are used daily for food in some of the larger centers.

It may truly be said that buffalo are raised everywhere, and since this animal is extremely hardy it can always find enough to eat, even in the forests.

The administration is encouraging the raising of buffalo in a most effective way, and since our arrival in Laos the work has grown by such proportions that exports of buffalo to nearby regions has assumed genuine importance. (4,721 head in 1898 and 3,144 in 1899.) When we entered into possession of Laos, however, the land had been largely depopulated of its animals. They had been removed by the Siamese, and it is nothing short of miraculous that the herds have been restored in so short a time despite the considerable losses caused by periodic outbreaks of epizootic disease, often extremely violent.

These favorable results have been achieved thanks to the wise foresight of the higher authorities, who prohibited all exports and imports as long as the bovine plague lasted.

231 highly developed canine teeth.

There is another variety, not so tall and lighter in color, which is widespread mainly among the Laotian population on the banks of the Mekong and its tributaries.

[407] Cammon exports pigs to Annam. In 1899, 6,038 of these animals representing a value of 30,565 francs were exported from this province.

Chickens. The Meos have a variety of chicken which is much taller than the chickens of the plains. They make a current practice of caponizing, and this procedure produces chickens which are highly esteemed by Europeans for the firmness of their meat and the delicacy of their taste.

Goats. The raising of goats does not call for any particular remarks. It is done naturally without any particular care, and is localized in northern Laos. In southern Laos goats are found only in the wild state. Europeans have brought in a few domesticated goats for their own use.

231 Sheep. It would be interesting to try sheep raising on the high plateaus of northern Laos. It has been denied that any undertaking
185 of this nature could succeed, but it would seem that no serious attempt has as yet been made. It would first be necessary to choose a breed capable of multiplying on ground similar to that of northern Laos with respect to altitude, climate, forage, hygrometric conditions, constitution of the soil, etc. Since sheep do not withstand humidity well, it would also be necessary to move the flocks to high, dry points during the months of the rainy season. Afterwards, at the beginning of the dry season, they could be returned to pasturages in the plains.

[408] [Blank page]

[409] [Illustration at top of page]

CHAPTER VIII

1. NUMBERS, WEIGHTS, MEASURES AND COINAGE

805 Since numbers, weights, measures and coinage serve as a basis
802 for all transactions and all commercial evaluations, we shall here

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the steep slopes of certain peaks, the brinks of torrents, etc.--are being subjected to new routings or improvement projects which will soon be carried out. (Bulletin économique de l'Indo-Chine, loc. cit.) [Translator's note. This seems to be a reference to the December 1899 number, "Notes du Commandant supérieur du Bas Laos sur la région est du Bas Laos."]

elephant back).

Province of Saravane. 1. Road from Ban-Mouang to Saravane by way of Kham-Thong-Niai, along the Sedone (4 to 5 days). This road is a first category road over a distance of five kilometers from Keng-Kok to Keng-Pho. The falls of the Sedone can thus be avoided by a cart road at all seasons of the year. Over the rest of its route the road belongs to the second category.

2. Road from Saravane to Attopeu by way of Thateng, the plateau of the Bolovens, Nong-Bok and the Se-Pien (4 to 5 days. Second category).

3. Road from Saravane to Ai-Lao by way of Muong-Nong (a poor path).

Province of Darlac. 1. Road from Ban-Me-Thuot or Darlac to Ninh-Hoa (Annam). A six or seven day trip. This is a cart track on the Laotian side of the divide, that is to say as far as Ai-Bloum. At Me-Sao a branch forks toward Cong-Son (Annam). This is a portion of the route selected for the Saigon-Qui-Nhon railway.

[478] 2. Cart road from Ban-Done to Kratie, either by way of the Pou-Kha (10 to 12 days), or by going around the mountain to the north and connecting with the road from Stung-Treng to Kratie at Sreki.

2. PROJECTED LAND ROUTES OF COMMUNICATION

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Three large highways are projected, namely:

1. From Savannakhet to Ai-Lao and Hué; [Illustration here]
2. From Pak-Hin-Boun to Vinh by way of Ha-Trai;
3. From Luang-Prabang to Vien-Tiane.

These roads will be negotiable by carts and will be provided with iron and wooden bridges. Engineering officers have been placed at the disposition of the Superior Resident of Laos to make a study of these various routes.

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A credit of 32,500 francs has been established for the construction of [479] these roads in the 1900 budget, and another of 10,000 francs has been set aside for improving the existing roads.

These credits are allocated for meeting the costs of equipment, iron, skilled labor, etc. Current repairs are made through statute labor and payments in kind which all registered persons owe.

Supervision of these projects falls to the inspectors and chief guards of the native civil guard.

With support such as this, it becomes clear that it will be possible to carry out quite large road projects with credits which might seem quite insufficient at first glance. It is true that they will be renewed as the need arises.

3. PRESENT RAILWAY ROUTES

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"There is only one railway in Laos. It crosses the island of Khone and is used for transhipment of passengers and goods from the lower reach to the Khone-Pakmoun reach and vice versa. It is a narrow railway, with a gauge of one meter. It is 4.5 kilometers long. It was built by the administration and placed at the service of the River Merchant Fleet [Messageries Fluviales]."

4. PROJECTED RAILWAY ROUTES

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"A railway is planned which will connect the great middle reach of the Mekong with a seaport in Annam, passing through Ai-Lao, Quang-Tri and Hué. This would make it possible for all the products of central Laos to flow down towards Annam, and avoid for transports in general the disadvantages and dangers of the Kemmarat rapids. Studies for this line were begun in the first days of 1899, and have continued during the dry season of 1899-1900" (1).

(1) Le Laos français, op. cit. [Lieutenant-colonel Tournier (Superior Resident in Laos), "Notice sur le Laos français," in Revue Indochinoise, Hanoi, 1900.]

The portion of this line in Annamite territory, that is to say the Quang-Tri-Hué-Tourane section, is included in the schedule of expenditures to be covered by a loan of 200 millions, to the extent of 24 millions. Since it is 195 kilometers long, the cost comes to 125,000 francs per kilometer.

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[480] Construction of this line was authorized by the law of December 25, 1898, but its extension to the Mekong, and that is to say the means of entrance into Laos, is classified among the lines of third-degree urgency for which routes have scarcely been outlined.

Another railway has also been planned from Binh-Dinh to Attopeu, with the same third-degree urgency classification as the line from Savannakhet to Quang-Tri. It seems astonishing that anyone should have thought, even as a line of third-degree urgency, of a line which would start from the sea and end in a cul-de-sac, crossing one of the most mountainous regions which is inhabited by Kha tribes who are still partly unpacified. It may be that there is some thought of facilitating, by means of such a line, the exploitation of the gold and copper-bearing deposits in the region of Attopeu, even though it has now been established that the best deposits are located on the Se-Sane, more than 50 kilometers to the south of this point as the crow flies. It is also to be feared that by reason of the nature of the terrain this line may cost as much as 200,000 francs per kilometer, if the conditions of its route be compared with those of the lines estimated at 125,000 francs.

The projected Savannakhet-Quang-Tri railway does not seem to be the best solution for creating an entry into Laos and an outlet to the sea.

In the first place, it is not the shortest and most economical, despite the low elevation of the ridge of Ai-Lao, which is only 410 meters in altitude.

Besides, Savannakhet has never been a trade center and market of distribution and transit like Luang-Prabang, Pak-Lay, Nong-Khay and Bassac.

To be sure, it is an administrative center situated opposite the market of Ban-Mouk and the seat of the main office of the Cochinchina River Merchant Fleet Company [Compagnie des Messageries Fluviales], which has storehouses, a depot, workshops, etc. there. But this center was built up from nothing scarcely six years ago. The market of Ban-Mouk is an unimportant one, and the office of the River Merchant Fleet is inaccessible to its steam launches during a large part of the year.

[481] If Nong-Khay, instead of Ban-Mouk, were located opposite Savannakhet, there would be an advantage to capturing this great market in which the major part of the trade of Upper and Middle Laos is centered, and to turn this trade away from Bangkok to the profit of Tourane. But one must surrender to the evidence, for Nong-Khay

653 is no further from Vinh than Savannakhet is from Tourane. In fact,
496 the distance by steamship to Hin-Boun (or Tha-Kek) and from there
• 185 to Ben-Thuy [Illustration here] (port of Vinh) by way of Nape, the
438 ridge of Tram-Mua and Ha-Trai by railway is only 500 kilometers,
633 whereas it is also 500 kilometers from Savannakhet to Tourane.

It has been objected that the ridge of Tram-Mua, the highest
496 point on the line in question, is at an altitude of more than 1,200
185 meters, that many calcareous peaks encumber the route, and that the port of Ben-Thuy has a sand bar (that of Cua-Hoi) which leaves a depth of water of only 1.5 to 4.5 meters, depending on the tide.

All of this information is correct, although somewhat exaggerated. The ridge of Tram-Mua is not an insurmountable obstacle, and the road which crosses it leaves the Mekong at the 250 meter level and manages to reach it by rounding the [482] peaks of Pou-Hak and Pou-Kha-Sak and by rising gradually, ascending 1000 meters over a distance of about 140 to 150 kilometers.

Ha-Trai, moreover, which is situated on the river of Ngan-Pho, is at approximately the 100 meter level, and the descent from the ridge requires half a day on elephant back. The slope is very steep, without any doubt, on the Annamite side, since it represents the hypotenuse of a right triangle with a base 15 kilometers long and an altitude of 1,100 meters. It is not such, however, as to make the establishment of a railroad impossible, and cog-railways could also be used, as in Switzerland, at the steepest parts of the route.

Finally, the bar of Cua-Hoi is only an imaginary obstacle. Indeed, it would be sufficient merely to extend the railway beyond the bar, where the foundation is everywhere solid enough, or else to dredge a channel.

From the financial point of view the advantage also lies with the Hin-Boun-Ben-Thuy project, which will cost 30 millions instead of 61. Indeed, expenditures of 24 millions are anticipated for the Quang-Tri-Tourane section, to which 37 millions must be added for the Quang-Tri-Savannakhet section (about 300 kilometers at 125,000 francs per kilometer), whereas if we assume a cost of 150,000 francs (1) per kilometer for the Hin-Boun-Ben-Thuy line (about 200 kilometers),

(1) Cost anticipated for the Vietri-Lao-Kay and Saigon-Qui-Nhon lines.

we are confronted with an expenditure of 30 millions. The difference between 30 and 61 millions is so great that it would even be possible

to anticipate, for the line which we recommend, a much higher cost per kilometer (although this has not been demonstrated) than the cost which we assume.

Both lines--the one from Hin-Boun (or Tha-Khek) to Ben-Thuy and the one from Savannakhet to Quang-Tri--have their partisans. The latter line is more in favor, but we believe that, like its rival, the line from Hin-Boun to Ben-Thuy should be studied by engineers, who, without any preconceptions, would draw up an estimate [483] which could be compared with the other and serve as a basis for evaluation by the government of Indo-China.

In conclusion, when the Hanoi-Nam-Dinh-Vinh section is completed, and if it is joined to the line of which we have been speaking, it will constitute a network connecting the Mekong with Tonkin and eventually with the great central region of China by way of Lao-Kay, whereas the Quang-Tri-Tourane section is destined to remain isolated, with no connection either with the north or the south, for a period of time which is as yet indeterminate (1).

(1) The Superior Resident favors a line connecting Tran-Ninh to the coast:

"The opening of this railway would not bring profit to Tran-Ninh only, and it is certain that the line would be used not only by all officials and travelers who had to reach the upper reach of the Mekong and even the middle reach, but also by the greater part of the merchandise destined for these reaches.

"I have no doubt but that, the day this railway is opened, it will have to be extended to Luang-Prabang, which it will be possible to reach in less than three days from Vinh by this means. Another branch extended from Xieng-Khouang towards Pak-San would give us the whole Mekong trade, and the problem whose solution we are now pursuing would then be solved. There would no longer be any need to seek a route from Luang-Prabang to Tonkin, from Outhene to Vinh, or from Savannakhet to Hué, and there would no longer be any need to explore the possibilities of navigation through the Kemmarat rapids or between Vien-Tiane and Luang-Prabang. The two reaches, separated by rapids which have heretofore been regarded as an obstacle to commercial steam navigation, would be opened up and would be less than three days' distance from a seaport.

"On that day the colonization of Laos will take a giant stride, and the land will be wholly opened to all the enterprises

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which the difficulty of communications is now impeding."
(Bulletin économique de l'Indo-Chine, loc. cit.)
[Translator's note. Probably refers to December 1900 issue, "Rapport du Résident supérieur sur le Tran-Ninh."]

5. POSTAL AND TELEGRAPH SERVICE

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The telegraph network in Laos is quite complete. At the present time only three commissionerships are not served by a telegraph line, those of Tran-Ninh, the Hua-Pahn and Darlac. All the other provinces possess one or several telegraph offices, where postal service is also provided.

Examination of Plate VI will show the extent of the telegraph network in Laos. The lines are divided into two sections: the northern one which is under the jurisdiction of the Annam-Tonkin central office, and the southern one which is attached to the Cochinchina-Cambodia central office. [484] The two sections are not connected with one another, but soon will be. Tonkin will then be in communication with Cochinchina by means of a line which will cross all of Laos from north to south.

When this result has been achieved, that is to say when the Luang-Prabang-Vien-Tiane section has been completed, the Laotian network will be 2,283 kilometers long: 1,168 in Upper Laos and 1,115 in Lower Laos.

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By the terms of a contract between the administration and the Cochinchina River Merchant Fleet Company [Compagnie des Messageries Fluviales], the latter was made responsible for the transport of postal dispatches on the Mekong as far as Luang-Prabang (1). Outside

(1) This company receives an annual subsidy of 300,000 francs from the government of Indo-China for this purpose.

of the region of the river, and even in certain stretches served by the Company where service can be made more rapid, the administration has recourse either to human carriers or to pirogues.

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6. SERVICE BY THE RIVER MERCHANT FLEET [MESSAGERIES FLUVIALES]

Transport for merchandise and passengers is provided on the Mekong as far as Luang-Prabang by the Cochinchina River Merchant

who were disposed to follow them.

464 563 stitions and perhaps also the opposition of the mandarins who for centuries have tried [516] to prevent any exodus towards the lands situated beyond the mountains, have in the long run made him a stay-at-home.

000 This industrious, intelligent and prolific people prefers to struggle for life in agglomerations which are too dense, rather than emigrate in order to obtain a life of well-being and ease.

We should not, however, despair of ever seeing the Annamites spread into Laos and there provide a powerful force for repopulation and make the low plains which border the Mekong from Cammon to Cambodia bear fruit. It is up to us to destroy the legends, to reduce to nothingness the superstitions which have gained currency, and then to use our influence to bring an end to the ostracism in which Laos is held. Does it not belong today to the great Indo-Chinese family in which all the component peoples are French subjects in the same right?

On the day when the mandarins no longer sustain a fear of Laos and a dread of slavery among the Annamites, it will be possible to induc them to emigrate into the Mekong basin. The colonies already in existence, particularly at certain points in Cammon, will grow from that day on through the addition of newcomers. We must not deceive ourselves into thinking that such immigration will not take time, and so in order to meet our most pressing needs European colonies in Laos will have to appeal to laborers from the southern provinces of China and especially from the island of Hainan, that inexhaustible reservoir which has supplied coolies to several parts of the world for so many years.

But, it will be asked, is Laos ready to welcome colonists who want to work the mines and forests and to engage in trade, agriculture and livestock breeding? We believe that, in the present state of communications, some of these undertakings are possible at this moment and that others cannot hope to succeed until the country's economic equipment has developed.

316 313 185 As concerns commerce and the exploitation of forests and mines, we have noted that several attempts have already been made. These are valuable indications showing the [517] courses which isolated colonists or companies which would like to employ their capital in our new possession can follow as of the present time. Indeed, such undertakings yield profits almost from the very beginning, and if they are

316 begun at judiciously chosen points [Illustration here] they can be accommodated to the existing means of communication and transport
313 if necessary. As for the sums needed to engage in a commercial,
185 mining or forest enterprise, it is difficult to determine these in any precise fashion for, depending on the region and the special conditions of the terrain, such matters may require more or less capital.

● [518] For dealing in teak wood (1), for example, the sums needed

(1) A rigorous investigation made by a chief guardsman of the Laotian militia of the region of Xieng-Khong, on the left bank of the Mekong, has shown that the number of teak trees ready for cutting in the province of Muong-Sing is 4,975 in all, 2,000 of which are of exceptional size for the region, that is to say that their diameter varies between 0.3 and 0.6 meter. Counting the young shoots and young trees, the total number of teaks which we possess in Muong-Sing may be estimated at about 20,000.

Another group is situated on the right bank of the Mekong, in the vicinity of Pak-Lay and in the basin of the Nam-Poun. It includes from 10,000 to 12,000 teak trees ready for cutting, concessions for about half of which have been granted. (Bulletin économique de l'Indo-Chine, 1900.)

for purchase and transport would depend on the quantity which it was desired to export. As an average indication, the sum of 40,000 francs might be given for operations on 1,000 teak trees.

From the point of view of mineral resources, certain deposits require capital in the millions for their exploitation, while others might be worked profitably with sums varying between 250,000 to 500,000 francs.

433 In the way of industries which may be started at the present time,
185 we may cite only the establishment of rice distilleries in southern Laos and of a mechanical sawmill at Khone.

[273] A distillery could be set up without any great expense at the
[243] mouth of the Mekong and the Sedone, for example. Thanks to the price of glutinous rice which is five or six times less expensive in this region than at Pnom-Penh, the alcohol from such a distillery would find a certain market in Cambodia.

185 For several years now there has been talk of establishing a
313 mechanical sawmill on the island of Khone which would obtain its motive power from the nearby waterfalls. Besides teak wood (2),

439 (2) Teak is generally regarded, although wrongly, as the wood

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with the greatest value on European markets, but woods which are very common in Indo-China are often just as highly esteemed. Among others we may cite the "Mai-Niang," the "Mai-Thon" (mock walnut), the "Mai-Deng" (rosewood), the "Mai-Dou" (thuja), the "Mai-Lang-Dam" (ebony), etc.

a great many other varieties of trees could be used to feed the saw-mill and, like alcohol, find an easy outlet in Cambodia and Cochin-china.

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[519] Finally, one other enterprise might be attempted. This is livestock breeding and particularly the raising of oxen, which sell in Cambodia and Cochinchina for double their value in their country of origin. We have previously mentioned some of the points which would be particularly well-suited to undertakings of this nature. The greatest hazard to be feared is the appearance of epizootic epidemics such as the ones which occur almost periodically and against which there is no weapon. The Pasteur Institute of Nha-Trang does not send out [illustration here] anti-plague serum as is done with cow-pox vaccine, for as yet its incoulation must be left in the hands of specialists.

We believe that the system of livestock leasing would perhaps yield good results with the Laotian peasants.

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Since no serious attempt has as yet been made in Laos, it is difficult to treat of agricultural enterprises which Europeans might undertake. Nor must we forget that affairs of this sort require comparatively large sums of capital and professional knowledge which takes a long time to acquire. It is, moreover, up to the administration to provide the initial impetus, for it has the necessary means, equipment and personnel. When plantations have succeeded it [520] will easily find colonists to continue the work which has been begun, and capital will then find its way into Laos.

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Speaking for ourselves, we are persuaded that this land will soon be open to colonization. Only the coast of Indo-China is well-known, and on the day when it has been demonstrated that the mountains as well are a source of wealth, the fortune of Laos will be made. There is a blank page on which it is up to us, by profiting from the gropings and errors of the past, to trace the principles of true colonization, which provides well-being for the population and creates outlets for our industry and our commerce.

A very high official of Laos recently wrote, speaking of the development of this land: "Once everything was for Tonkin and

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•185 In case our proposal should be accepted and the matter once more taken under consideration, we should advise that it be undertaken in the following way.

It would be well, especially in the beginning, to treat the gold-bearing alluvia by washing in a sluice and to extract the gold by amalgamation and cyanidation. The results would be sufficiently remunerative to make it possible, even while realizing profits, [126] to study and make ready for further exploitation of the lodes by means of more complete and more highly developed equipment. Such a procedure would, in our opinion, be wise, foresighted and of such a nature as to inspire a just confidence in capitalists. It would also enable them to advance in a sure fashion and with a well-founded hope of certain profits. Such profits, if held in reserve by prudent administrators, could not only provide sizeable dividends, but also go to increase the initial capital to any figure deemed necessary for exploitation at a later date of the deep-seated lode-bearing deposits.

The volume of these alluvial gold-bearing deposits may be estimated at approximately four million cubic meters, with an average weight of more than seven million tons.

They are all situated near that part of the Mekong which is navigable all year long by pirogues and rafts of from one to three tons, and in a reach which can be served by steam launches as far as Luang-Prabang during nearly five months of the year.

The countryside, moreover, is fairly well populated, offers sufficient resources in the way of food and contains a population which could provide more than a thousand specialized workers who have been accustomed since their childhood to treating gold-bearing alluvia (1).

(1) The study by M. Mallet shows us that all this part of the kingdom of Luang-Prabang is rich in gold. The gold extracted by the natives comes either from the sand of the river beds, from consolidated alluvia near the banks, or sometimes from hillside mines at a somewhat higher altitude, but never from direct treatment of the primitive rock, that is to say from gold-bearing quartz. The rock samples have always yielded amounts of gold which were insufficient to justify any attempt to treat them, but it would be entirely natural to try to work the consolidated alluvia. In the latter task, as M. Mallet's report proves, experienced miners could probably be recruited with ease "who would not be afraid to go down seven or eight meters and dig veritable mine

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galleries at this depth."

During this period of limited exploitation of the alluvia, which are quite rich, detailed studies could be made of the region in order to determine whether the gold content of the deep-seated rocks is really as slight as M. Mallet's summary explorations would seem to indicate. (Report by M. Courillon, head of the geological service of Indo-China.)

2. DEPOSITS OF VIEN-TIANE, NONG-KHAY

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That part of the territory of Vien-Tiane and Nong-Khay which is situated in the 25-kilometer restricted zone contains vast deposits of gold-bearing gravel which are deposited on the bottom of an immense basin about 5,000 square kilometers in area. The deposits are covered with a layer of more recent alluvia which varies from 7 to 12 meters in thickness.

The Mekong and its left and right bank tributaries called the Nam-Ngume, [127] the Nam-Tone, the Nam-Sang, the Nam-Soue and the Nam-Luong, now flow through this elliptical basin which straddles the intersection of the 100th meridian and the 18th parallel.

Between 1896 and 1898, after prospecting the deposits in the region of Nong-Khay, Tourakhome, Nam-Tone and Pone-Pissaye, we there noted the presence of the same bank of gold gravels at several points which were quite far apart.

Not until after discovering that they were currently being worked by the natives in several villages on the banks of the Mekong and in the upper part of its tributaries, did the idea occur to us to examine these deposits more closely.

These studies have been the object of several official reports in which we expressed the theory that two twin lake basins once existed on the two present banks of the Mekong, and that their bottoms would be covered by a sedimentary stratification of gold-bearing gravels about two meters in thickness.

According to one of our consuls in Siam, this hypothesis has been found to be correct by prospectors of various nationalities on the right bank of the Mekong, at several widely separated points both on the circumference and in the center of the lake basin. Supposing this to be true, our theory is thereby confirmed and the presence of gold noted under the conditions which we suggested.

The natives have for many years exploited the gold-bearing gravels on the Nam-Sang, the Nam-Tone, at Tourakhome and at